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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Application Number: 09/939,624
Filing Date: August 28, 2001
Appellant(s): ROBERTS, ROBIN U.

Randi L. Karpinia
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 7 November 2008 appealing from the Office action mailed 15 July 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The Examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,845,091	OGIER ET AL.	1-2005
6,813,272	AN ET AL.	11-2004
2002/0071477	ORAVA	6-2002
2002/0159385	SUSNOW ET AL.	10-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 39, 43-44, 46-47, 51-53, and 57-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogier *et al.*, U.S. Patent No. 6,845,091, in view of An *et al.*, U.S. Patent No. 6,813,272.

Regarding Claims 39 and 52, Ogier *et al.* discloses a wireless ad hoc multi-hop network comprised of a plurality of mobile nodes (Abstract, Column 3 Lines 7-28, Fig. 1). Each of the plurality of nodes may operate in an off mode and a sleep mode (Column 15 Lines 23-29). Each node maintains a neighbor table that contains an entry for each neighboring node and its operational state; these operational states are lost, heard, and symmetric; in the lost state, the neighboring node is either in the sleep or off mode or out of range (off state), in the heard mode, the neighboring node is turned on and has transmitted a HELLO message, but it may not be able to hear its neighboring nodes (which would qualify as an active, non-relay state), and in the symmetric mode, the node and

its neighbor can heard each other (active, relay state) (Column 29 Lines 15-40, Table 3).

Ogier *et al.* does not expressly disclose an active and non-relay state wherein a node receives data packets addressed to it and transmits data packets sourced from it, yet does not relay any packets addressed to another node.

An *et al.* discloses a quality of service (QoS)-based routing method for an ad hoc network, whereby the path with the optimum QoS is selected (Abstract, Column 2 Lines 31-38 and 63-65, Figs. 1-17). The total accumulated QoS for a given path is calculated at a current node in said path (wherein said path starts at a designated starting node), and the next node is chosen from the set of neighbor nodes to the current node; neighbor nodes not meeting QoS requirements are excluded from being relay nodes for the particular call being set up (though these excluded nodes send and receive data for QoS determination, they are simply not part of those selected path for the new call) (Column 5 Lines 25-43, Column 9 Lines 1-33, Figs. 1-2, 4, and 6).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to modify the invention of Ogier *et al.* by providing for an active and non-relay state wherein a node receives data packets addressed to it and transmits data packets sourced from it, yet does not relay any packets addressed to another node.

One of ordinary skill in the art would have been motivated to make this modification because ad hoc network algorithms that involve each node exploring and collecting information associated with all paths involving themselves (that is, all nodes not only sending packets sourced from themselves and receiving

packets addressed to themselves, but also acting as relays for various others nodes that are also involved in collecting path information) require large amounts of time and network bandwidth (An *et al.*: Column 1 Lines 51-61).

Regarding Claims 43-44, 53, and 57, a node is informed of the operational states of its closest neighbors (Column 30 Lines 1-60).

Regarding Claims 46-47 and 58-59, when a node is in the lost operational state (due to being in sleep mode, or out of range, *etc.*), it is both a non-infrastructure component and a non-group member, in that it is isolated from the rest of the ad hoc nodes (Column 29 Lines 19-31).

Regarding Claim 51, each node comprises a topology table that stores details of connections to said node's neighbors (Column 10 Lines 7-21).

3. Claims 40-41, 45, and 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogier *et al.* in view of An *et al.*, further in view of Orava, U.S. Patent Application Publication 2002/0071477.

Neither Ogier *et al.* nor An *et al.* expressly discloses that the operational state of each respective node is determined using configuration information received from their respective users and neighboring nodes.

Orava discloses a wireless device, a plurality of which are used in an ad hoc network, the plurality of wireless devices acting as nodes connected to each other (Abstract, [0016], [0020], Figs. 1-3). Each wireless device may operate in one of several states, including a standby state and a connection state, whereby in order to establish a connection route, a wireless device discovers other wireless devices in its area that are available ([0043]-[0049], Fig. 6). When a wireless device is attempting to make a connection, it is in an

inquiry substate, and it receives user information and network information in the form of Bluetooth device addresses and clock information of all wireless devices that respond to the inquiry; the master determines which wireless devices are in the default standby state, and therefore, available as slaves ([0044]-[0045], [0047]).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to modify the invention of Ogier *et al.* as modified by An *et al.* by providing for nodes that have operational states that are determined by configuration information received from their respective users and neighboring nodes.

One of ordinary skill in the art would have been motivated to make this modification in order to facilitate the establishment of new connections (Orava: [0044]).

4. Claims 48-50 and 60-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogier *et al.* in view of An *et al.*, further in view of Larsen *et al.*, U.S. Patent No. 6,810,428.

Ogier *et al.* discloses the use of laptop and desktop computers as the nodes, which may be line powered (Column 5 Line 58 to Column 6 Line 7).

Neither Ogier *et al.* nor An *et al.* expressly discloses the grouping of wireless device nodes by class, a class being selected from the group of classes comprising nodes connected to line power, nodes with a high remaining battery life, nodes with the least interference, nodes with the least available energy, and high performance nodes.

Larsen *et al.* discloses a wireless communications network comprised of multiple mobile terminals, along with a method of operating such a network (Abstract, Column 1 Lines 30-35, Fig. 1). The user terminals comprise transceivers that are able to transmit wireless communications data to destination user terminals or receive wireless communications data from destination user terminals by way of intermediate user terminals in the same network (Column 4 Lines 34-37 and 51-63, Column 5 Lines 4-9, Fig. 1). The user terminals comprise controllers that are able to allow or prevent the transmission of said wireless communications data based on routing data related to the powers required for transmission, powers available for transmission, connection quality, and the potential levels of interference between neighboring user terminals (Abstract, Column 1 Lines 40-45 and 64-66, Column 2 Lines 15-38, Column 4 Line 65 to Column 5 Line 3, Column 16 Lines 53-61, Column 25 Lines 26-35).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to modify the invention of Ogier *et al.* as modified by An *et al.* by grouping nodes by class, a class being selected from the group of classes comprising nodes connected to line power, nodes with a high remaining battery life, nodes with the least interference, nodes with the least available energy, and high performance nodes, whereby an immediate neighbor node is set to either the connection state or the standby state when a node belongs to one of these classes.

One of ordinary skill in the art would have been motivated to make this modification because required power levels, available power, and interference

are common concerns in wireless networks, especially ad hoc wireless networks, which involve low power devices and data being sent via several links.

Claim Objections

5. Claims 42 and 56 are objected to as reciting allowable subject matter, yet being dependent on rejected Claims 39 and 52, respectively.

Ogier *et al.* discloses the ability for a node to be in a state that is active and non-relay, as outlined above.

Neither Ogier *et al.* nor An *et al.* expressly discloses the reception, by wireless device nodes, of economic credits for the relaying of one or more packets, wherein each of said nodes includes an associated number of economic credits and an associated maximum number of economic credits, whereby a given node is switched to an active, non-relay state when said associated number of economic credits equals or exceeds said maximum number of economic credits.

Susnow *et al.* discloses the use of flow control credits in the transmission of data packets in a wireless network, and the comparison of the current number of accumulated credits with a credit threshold, in the context of data sent from a source node to a destination node by way of intermediate nodes in a wireless network ([0017], [0037], [0071]).

Susnow *et al.* does not expressly disclose the reception, by the wireless nodes, of economic credits for the relaying of one or more packets, wherein each of said nodes includes an associated number of economic credits and an associated maximum number of economic credits, whereby a given node is

switched to an active, non-relay state when said associated number of economic credits equals or exceeds said maximum number of economic credits.

(10) Response to Argument

Appellant asserts, on Page 8 of the Appeal Brief, that “The “active” part describes network participation, not the functional state of the node.” On the contrary, neither Claim 39 nor Claim 52 defines the distinction between "off" and "active". According to Appellant's logic, wherein “active” refers to a node that participates in the network (whereby said participating node may or may not relay packets), a node in the "off" state is a node that may be turned on (*e.g.*, is functional) and that simply does not participate in the network (because “active” is used as the opposite of “off” in Claims 39 and 52, as Appellant clearly admits that “not active" is the equivalent of “off” with the words ““not active, not relay”, which is functionally the same as our “off” state” on Page 8 of the Appeal Brief). Such a definition of the "off" state is a clear contradiction of the plain meaning of the word "off" because a node that is turned on may be considered to be in the "off" state as a logical consequence of the definition of “active” provided by Appellant on Page 8 of the Appeal Brief. Furthermore, Appellant’s statement, on Page 8, that “For # 1, while Node B is functional and not relaying data, it is not active in the network because it cannot receive it’s [sic] own data. So the equivalent state would be “not active, not relay”, which is functionally the same as our “off" state. [emphasis added]" constitutes an explicit agreement that Appellant is maintaining that a node in the “off" state may actually be turned on.

Appellant asserts, on Page 8 of the Appeal Brief, that the Heard state disclosed by Ogier *et al.* does not constitute an active, non-relay state because of three possibilities associated with said Heard state: "

1. Node B can not hear node A, and A-B is the only available link.

2. Node B can not hear node A, but an alternate link is available for return communication from A to B.

3. Node B can hear node A. This is a transitory condition that will become the "Symmetric" state, since B must soon hear node A's Hello message. In the interim, Node B will operate as 1 or 2, above."

Appellant further asserts that "For #1, while Node B is functional and not relaying data, it is not active in the network because it cannot receive it's [sic] own data." On the contrary, Node B is active precisely because, as Appellant admits, it is functional (*e.g.*, not turned off or in a sleep mode); see the previous paragraph for an explanation as to why Appellant's definition of "active" is flawed.

Applicant also asserts that "Case #2 describes Node B that is active in the network, since both a B-to-A and A-to-B links [sic] exist. So Node B can both send and receive traffic. But there is nothing in the state information to differentiate between types of traffic, so it will both send and receive it's [sic] own traffic as well as send and receive other traffic (relay). So the equivalent state is "active, relay."" On the contrary, if Node A does not know whether or not Node B can hear it, then Node A obviously cannot directly use Node B to relay data from Node A, and therefore, for the purposes of Node A sending data to a given destination, Node B is not in a relay state, and therefore Node A considers Node B to be in a non-relay state. Therefore, Node B may be receiving packets from

Node A addressed to Node B, as per the relevant limitation in Claims 39 and 52, but is in a non-relay state with respect to Node A, since Node A does not know whether Node B can hear it (perhaps because Node A cannot hear Node B, despite Node B being able to hear Node A and thus able to receive packets from Node A, whereby Node A does not use Node B as a relay for packets addressed to some third node precisely because Node A does not know whether Node B can hear it).

Appellant asserts, on Page 9 of the Appeal Brief, that “Applicant's claimed invention is based entirely on the needs of the node whether to relay or not, not the needs of the packet stream. All claims are that a node can choose not to participate as a relay node, regardless of the impact to the network or packet traffic. Since Applicant’s claims are in direct opposition to the needs stated in the Field of Invention in An et al., it would NOT be obvious for someone to extend the common usage of a QoS mechanism to allow a node to operate in what would be a detrimental manner.” On the contrary, the invention of An *et al.* is directed to the needs of both the system as well as individual nodes: "Another object of the invention is to provide a routing method for providing route information about nodes passed between a source node and a destination node to those nodes in order to prevent re-transmission of the route information to nodes already passed, thereby preventing a waste of CPU capacity and bandwidth.” [Column 3 Lines 53-58]. Clearly, the QoS needs of the packet traffic are not met without consideration of the needs of the individual nodes.

Appellant states, on Page 9 of the Appeal Brief, that "Applicant respectfully disagrees with the explanation in the Office Action that efficiency is

important ... The two mechanisms function differently." First, efficiency and QoS are not mechanisms, rather, they are parameters that can be measured, and there is no valid reason why system optimization with respect to both efficiency and QoS can be performed. Second, in an ad hoc multihop network, where QoS is obviously very important, bandwidth efficiency is also very important because several nodes in close proximity are sharing spectrum. Efficiency in the use of node processing resources is clearly also important, because each node may have other tasks to perform (for instance, each node may be a laptop computer performing tasks for a user, in addition to routing data).

Appellant's argument, on Pages 10-11 of the Appeal Brief, with respect to the 35 U.S.C. 103(a) rejections of Claims 42 and 56, have been fully considered and are persuasive. Therefore, said rejections have been withdrawn, and Claims 42 and 56 are objected to as reciting allowable subject matter, yet being dependent on rejected Claims 39 and 52, as outlined above.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the Examiner in the Related Appeals and Interferences section of this Examiner's Answer.

(12) Conclusion

For the above reasons, it is believed that the rejections of Claims 39-41, 43-55, and 57-62 should be sustained.

Respectfully submitted,

/Matthew W Genack/

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